

[0097] FIG. 4 illustrates a method of dividing a plurality of sub blocks, according to an exemplary embodiment.

[0098] Referring to FIG. 4, the processor 120 may divide an image, which is acquired by capturing a display panel constituting the display panel apparatus 300, into a plurality of sub blocks 300-1-1, 300-1-2, . . . , 300-1-m, . . . , and 300-n-m.

[0099] For example, the processor 120 may determine sizes of a plurality of sub blocks based on a resolution of the display panel apparatus 300. If the sizes of the plurality of sub blocks are determined, the processor 120 divides the captured image into the plurality of sub blocks 300-1-1, 300-1-2, . . . , 300-1-m, . . . , and 300-n-m respectively having the determined sizes.

[0100] Thereafter, the processor 120 may calculate representative values of the plurality of sub blocks 300-1-1, 300-1-2, . . . , 300-1-m, . . . , and 300-n-m. In other words, the representative values may be differently calculated according to the plurality of sub blocks.

[0101] The processor 120 may calculate an average value of representative values of the first sub block 300-1-1, the second sub block 300-1-2, . . . , and an xth sub block 300-x-y to set a target value. However, the target value is not limited to an average value of representative values and may have various values like 80% of the average value of the representative values, and the like.

[0102] If the target value is set, the processor 120 may calculate calibration values of a plurality of sub blocks. Here, the calibration values may be differently calculated according to the plurality of sub blocks.

[0103] If calibration values are calculated according to sub areas, the processor 120 may transmit the calibration values to the display panel apparatus 300, and the display panel apparatus 300 may perform calibration of the display panel by applying the calculated calibration values to a pixel value of a corresponding sub area.

[0104] FIGS. 5A through 5E illustrate a method of calibrating a display panel apparatus, according to an exemplary embodiment.

[0105] As shown in FIG. 5A, a display panel constituting the display panel apparatus 300 may include a plurality of pixels and modules having preset sizes.

[0106] For example, if the display panel of the display panel apparatus 300 is calibrated with respect to each of pixels, calibration is uniformly performed with respect to all pixels as shown in FIG. 5B. If the display panel is calibrated with respect to each of modules, pixel values may be differently set according to modules as shown in FIG. 5C. However, if the calibration is performed with respect to each pixel as shown in FIG. 5B, there is a large amount of data to be processed, and thus a calibration time may be delayed. If the calibration is performed with respect to each module as shown in FIG. 5C, pixel values may be differently set according to modules, and thus brightness and colors are different according to the modules.

[0107] FIG. 5D illustrates a display panel where calibration is performed with respect to each sub area, according to an exemplary embodiment. In other words, the electronic apparatus 100 may calculate a calibration value by dividing the display panel into sub areas each including a plurality of pixels. In this case, the electronic apparatus 100 may perform calibration with respect to each of a plurality of sub areas. In other words, referring to FIG. 5E, if calibration is performed with respect to each of a plurality of sub areas, a

calibration time may be reduced, and an optimum calibration performance may be realized by adjusting sizes of the plurality of sub areas.

[0108] FIG. 6 is a flowchart illustrating a method of calibrating a display panel apparatus of a display panel apparatus calibration system in detail, according to an exemplary embodiment.

[0109] Referring to FIG. 6, the measurement apparatus 200 may be installed in a position at a preset distance from the display panel apparatus 300, and the position of the measurement apparatus 200 may be fixed when performing pixel calibration of a display panel of the display panel apparatus 300. An exposure, an aperture, a focus, and the like of the measurement apparatus 200 may be automatically or manually set. The display panel may be captured by using the measurement apparatus 200. The electronic apparatus 100 may divide the captured image into a plurality of sub areas. In this case, the electronic apparatus 100 may automatically set sizes of the plurality of sub areas based on a resolution of the display apparatus 300 or may receive sizes of the plurality of sub areas from a user.

[0110] The electronic apparatus 100 may calculate data of each of a plurality of sub blocks. Here, the data may be a representative value which is acquired by calculating an average value of brightness and color values of pixels constituting the plurality of sub blocks. The electronic apparatus 100 sets a target value based on the calculated representative value. In this case, the target value may be a value input from the user. Thereafter, the electronic apparatus 100 may calculate calibration values of the plurality of sub blocks and transmit the calculated calibration values to the display panel apparatus 300.

[0111] If the calibration values are received, the display panel apparatus 300 performs calibrations by respectively applying the calibration values to pixel values of a sub area. If calibrations are performed with respect to pixels of the display panel of the display panel apparatus 300, the measurement apparatus 200 checks a calibration performance by capturing the display panel of the display panel apparatus 300. In detail, if a pixel value of the display panel is within a preset value, calibration may be ended by determining the pixel value as spec in. If at least one of pixel values of the display panel is larger than a preset value, calibration may be iterated by determining the at least one pixel value as spec out.

[0112] FIG. 7 is a sequence diagram illustrating an operation of a display panel apparatus calibration system, according to an exemplary embodiment.

[0113] In operation S710, the measurement apparatus 200 may extract a pixel value of each pixel of a display panel by capturing a preset image displayed on the display panel and measuring brightness and color corresponding to the captured image. In operation S720, the measurement apparatus 200 may transmit the captured image and the extracted pixel value of each pixel to the electronic apparatus 100.

[0114] In operation S730, the electronic apparatus 100 divides the received captured image into a plurality of sub blocks. Here, sizes of the plurality of sub blocks may be determined according to a resolution of the display panel apparatus 300 or by an input of a user.

[0115] The electronic apparatus 100 may calculate representative values of the plurality of sub blocks in operation S730 and set a target value based on the calculated representative values in operation S740. In operation S740, the